

(12) INTERNATIONAL PUBLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
12 February 2004 (12.02.2004)

PCT

(10) International Publication Number
WO 2004/013921 A3

(51) International Patent Classification⁷: **H01L 51/20**

(21) International Application Number:
PCT/GB2003/003343

(22) International Filing Date: 31 July 2003 (31.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0217900.0 2 August 2002 (02.08.2002) GB

(71) Applicant (for all designated States except US): **QINETIQ LIMITED** [GB/GB]; Registered Office, 85 Buckingham Gate, London SW1E 6PD (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BARNES, William** [GB/GB]; School of Physics, University of Exeter, Stocker Road, Exeter EX4 4QL (GB). **SAMBLES, Roy** [GB/GB];

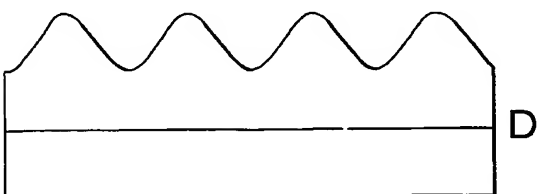
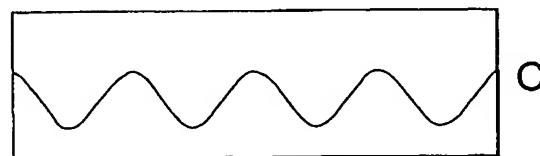
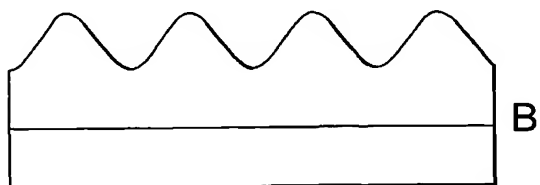
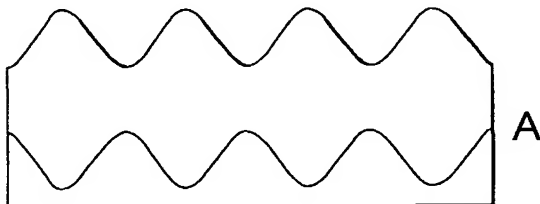
School of Physics, University of Exeter, Stocker Road, Exeter EX4 4QL (GB). **HOOPER, Ian** [GB/GB]; QinetiQ, Malvern Technology Centre, Bldg 55, Room 20, St Andrews Road, Malvern, Worcestershire WR14 3PS (GB). **WEDGE, Stephen** [GB/GB]; QinetiQ, Malvern Technology Centre, Bldg 55, Room 20, St Andrews Road, Malvern, Worcestershire WR14 3PS (GB).

(74) Agent: **DAVIES, P.**; IP QinetiQ Formalities, Cody Technology Park, A4 Building, Room G016, Ively Road, Farnborough, Hampshire GU14 0LX (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: OPTOELECTRONIC DEVICES



(57) Abstract: This invention relates to optoelectronic devices of improved efficiency. In particular it relates to light emitting diodes, photodiodes and photovoltaics. By careful design of periodic microstructures, e.g. gratings, Associated with such devices more efficient light generation or detection is achieved.

WO 2004/013921 A3